

Note: Based on the given material, a special test will be conducted in the 1st week of June.

Unit-1 Asexual and Sexual Reproduction in Plants

Milestones in Plant Embryology

Scientist	Year of Discovery	Discoverance
1. Nehemiah Grew	1682	Stamen- As male organ of flower
2. R.J.Camerarius	1694	Structure of anther, pollen & ovule
3. J.G.Kolreuter	1761	Insects importance in pollination
4. G.B.Amici	1824	Pollen tube
5. Hofmeister	1848	Structure of pollen tetrad
6. Hanstein	1870	Development of embryo in capsella
7. E.Strasburger	1878	Poly Embryony
8. E.Strasburger	1884	Process of syngamy
9. S.Gnawasohin L.Guignard	1898 & 1899	Double Fertilization
10. E.Hanning	1904	Embryo culture
11. D.A.Johansen	1950	Classification for Embryo development
12. S.Guha & S.C.Maheswari	1964	Haploid numbers in Datura -PG
13. E.S.Coen & E.M.Meyerowitz	1991	Genetics initiation in floral parts
14. P.Maheswari	1934	Book- An introduction to embryology of Angiosperms
15. K.V.Krishnamurthy	2015	Molecular aspects of pre & post fertilization

Definition of Asexual & sexual reproduction in plants

16. Terror of Bengal: Water Hyacinth is an invasive seed on water bodies like ponds, lakes is called as Terror of Bengal

17. Diaspores: The unit of reproductive structure used in propagation is called diaspores.

They are also called as reproductive propagules.

18. Epiphyllous Buds: Adventitious bud develop at Bryophyllum notches is called Epiphyllous buds. Usually they develop at the tip of plant and emerge as a new plant.

19. Totipotent: Parenchyma cells of the plants placed in a suitable medium which start dividing and produces a new plant. This process is called totipotency.

20. Microsporogenesis: The stages involved in the formation of haploid microspores from diploid microspores mother cell through meiotic division is called microsporogenesis.

21. Archesproium: Homeogenous mass of cells develops into four lobes and Hypodermal cells of it gets enlarged with conspicuous nuclei is called Archesproium.

22. Pollinium: Microspores formed from microsporangium held together to form pollinium. This is attached to a sticky structure called corpusculum.

23. Stomium: The thickening between two sporangia is stomium. It is hygroscopic in nature and helps in dehiscence of anther at maturity.

24. Types of ovules:

Name	Speciality	Example
a) Orthotropous	Micropyle, Funicle, chalaza is in vertical line	Polygonaceae
b) Anatropous	Ovule inverted Micropyle & funicle is close	Dicots & Monocot
c) Hemi Anatropous	Body of ovule is transversly placed	Primulaceae
d) Campylotropus	Body of ovule is curved at micropylar end.	Leguminosae
e) Amphitropous	Ovule curvature is Horse shoe shaped	Alismataceae
f) Circinotropus	Funicle is very long and surrounds the ovule	Cactaceae

25. Synergids: Synergids are the cells which is placed adjacent to the egg to secrete chemotropic substances to attract the pollen tube for fertilization.

26. Filiform Apparatus: The special cellular thickening of the egg apparatus is called filiform apparatus. It helps in absorption, conduction of nutrients from the nucleus to embryo sac.

27. Adaptation of Self Pollination

Type	Special Feature	Example
Cleistogamy	*Flower never open *Insect pollinated	Commelina
Homogamy	Stamen & stigma mature at same time.	Mirabilis Jalapa
Incomplete dichogamy	Stamen & stigma mature at different time	Date palm, Spinach

28. Geitonogamy: Deposition of pollen on another flower of same individual plant and the process is called geitonogamy. This occurs in Monoecious condition. Eg: Corn

29. Xenogamy: The process of deposition of pollen on another flower of a different plant of same species called xenogamy. Eg: Broccoli, Olive trees, Allium

30. Dicliny: Flower with unisexual nature and cross pollination possibility is called Dicliny. It is of two types.

i) Monoecious – Male & female flower on same plant

ii) Dioecious – Male & female flower on different plant

31. Monocliny: Flower with bisexual nature and special adaptation is called Monocliny. It is of three types.

i) Dichogamy – In Bisexual flowers anther & stigma mature at different time

ii) Herkogamy – In Bisexual flowers stamen & stigma are arranged heterogeneously to avoid self pollination.

iii) Heterostyly: Flower with different length of stamen and style.

32.

Protandry	Protogyny
It is classified under Monocliny - Dichogamy	- do-
Stamens mature earlier than stigma	Stigma mature earlier than stamen
Eg: Helianthus	Eg: Aristolochia, bracteata

33.

Distyly	Tristyly
It is classified under Monocliny-Heterostyly	-do-
Plant produces two form of flower – Pistyle & thrum eyed style	Plant produces 3 kinds of flowers – in the aspect of length of style & stamen.
Eg: Primula	Eg: Lythrum

34.

Types of Pollination	Agents	Special Feature	Eg.,
i) Anemophily	Wind	-Pollen grain is produced in more number -may or may not be effective -stigma is large, feathery	Grass, Sugarcane, Bamboo
ii) Hydrophily a) Epihydrophily	Water	Pollination at surface of water. Pollen grain is heavy, floats and reaches stigma.	Vallisneria Vallisneria, Spiralis, Elodea

b) Hypohydrophily		Pollination inside the water	Zostera Marina
iii) Zoophily a) Ornithophily	Bird	Flowers are brightly coloured, scentless, tough, leathery, large in size.	Erythrina
b) Malacophily	Snails	-	Araceae
c) cheiropherophily	Bats	-	Kingnesia Africana
d) Entomophily	Insects	Flowers large in size, colourful, scented, with nectar, juicy	Bougainvillea

35. Double Fertilization: Male gamete fertilise two different components of the embryo sac is called double fertilization.

Eg: Angiosperm

36. Post Fertilization changes:

Body of Ovule	Changes	Example
Receptacle	Edible part of fruit	Pyrus malus (apple)
Calyx	Covers the fruit	Physalis minima
Flower stalk & perianth	Juicy pear shaped body of fruit	Anacardium, Jack fruit
Outer integument	Fleshy structure, caruncle	Ricinus
Funicle	Fleshy colourful structure called aril	Myristica
Nucellar tissue	Perisperm	Black pepper

37. Apomixis: Reproduction involving fertilization in flowering plants is called Amphimixis.

Reproduction does not involve union of male & female gamete is called Apomixis. This is introduced by Winkler in 1908.

38. Agamospermy: It refers to the process by which Embryos are formed by eliminating meiosis and syngamy.

39. Diplospory: A diploid embryosac is formed from megaspore mother cell without meiosis. Eg: Aerva

40. a) Poly Embryony: Occurance of more than one embryo is called poly embryony. It was reported by Anton Van Leeuwenhock in 1719. Eg: In oranges

b) Parthenocarpy: The process of development of fruit from ovary without fertilization is called parthenocarpy. It is discovered by Nistch in 1963. They produce seedless fruits.

BIO-ZOOLOGY

Scientific Terms

Unit-1 Chapter-1 Reproduction in organisms

1. Asexual reproduction: Reproduction by a single parent without involvement of gamete.

2. Sexual reproduction: Two parents participate in the reproductive process involving two types of gametes.

3. Fission: The division of the parent body into two or more identical daughter.

4. Binary fission: The parent organism divides into two halves and each half forms a daughter individual.

5. Karyokinesis: The division of nucleus

6. Cytokinesis: The division of cytoplasm

7. Simple binary fission: It is seen in irregular shaped amoeba.

8. The transverse binary fission: The plane of division runs along the transverse axis of individual. Eg: Paramecium

9. Longitudinal binary fission: The nucleus and the cytoplasm divides in the longitudinal axis of the organism. Eg: Euglena
10. Oblique binary fission: The plane of division is oblique.
11. Multiple fission: The parent body divides into many similar daughter cells.
12. Encystment: The formation of three protective, chitinous cyst wall around amoeba is encystment.
13. Pseudo podiospore: The minute amoebulae formed by multiple fission.
14. Sporogony – Multiple fission of oocyte is called sporogony.
15. Schizogony – Multiple fission of schizont is called schizogony.
16. Strobilation – Several transverse fission occurring in Aurelia forming many individuals.
17. Plasmotomy: Multinucleated parent giving rise to many multinucleate daughter individuals. Eg: Opalina
18. Sporulation: Nucleus breaking into fragments and cytoplasm surrounding it, inside a spore case is sporulation.
Eg: Amoeba
19. Endogenous budding: Buds formed inside the cytoplasm of the parent body is called endogenous budding. Eg: Noctiluca
20. Exogenous budding: Buds are formed on the outer surface of the parent.
21. Gemmules: It is a hard ball with a internal mass of food-laden archaeocytes.
22. Fragmentation: The fragment body breaks into pieces each fragment develops into a new individual.
23. Regeneration: It is the growth of injured region.
24. Morphallaxis: The whole body grows from a small fragment of Hydra.
- Epimorphosis: It is the replacement of lost body parts. eg: tail of lizard.
25. Apolysis: The gravid proglottids are regularly cut off from the posterior end, this process is called Apolysis.
26. Syngamy – The fusion of two haploid gametes takes place to produce a diploid zygote.
27. External fertilization: The fusion of male and female gametes taking place outside the female organism in water is external fertilization.
28. Internal fertilization: The fusion of male and female gametes takes place with the body of female organisms.
29. Juvenile phase: The period between the birth and reproductive phase is called as Juvenile phase.
30. Senescent phase: This phase begins at the end of reproductive phase and degeneration in structure and function occurs in the body.
31. Hologamy: Mature organisms of lower organisms behave as gametes and the fusion of mature individuals is known as Hologamy. Eg: Trichonympha
32. Merogamy: The fusion of small sized and morphologically different gametes is called as merogamy.
33. Paedogamy: The sexual union of young individuals is called Paedogamy.
34. Isogamy: The fusion of morphologically and physiologically identical gametes is called as isogamy. Eg: Monocystis
35. Exogamy: The male and female gametes are produced by different parents and they fuse to form a zygote, they are biparental. Eg: Human
36. Anisogamy: The fusion of dissimilar gametes is called anisogamy. Eg: vertebrates and higher invertebrates
37. Autogamy: The male and the female gametes are produced by the same cell or same organisms and the gametes fuse to form zygote. Eg: Paramecium
38. Conjugation: The temporary union of two individuals of the same species, there is a certain amount of exchange of nuclear material by the conjugants. Eg: Paramecium

39. Parthenogenesis: Development of an egg into a complete individual without fertilization is known as parthenogenesis.
 40. Natural parthenogenesis: In certain organisms parthenogenesis occurs regularly constantly and naturally in their life cycle which is called as Natural parthenogenesis.
 41. Complete parthenogenesis: In certain organisms there is no biparental sexual reproduction. There are only male organisms, they have only females representing them.
 42. Incomplete parthenogenesis: In certain organism or animals both sexual reproduction and parthenogenesis occurs. Eg: Honey bees. The male drones develop from unfertilized eggs.
 43. Paedogenetic parthenogenesis: The larvae produce a new generation of larvae by parthenogenesis. Eg: Redia Larvae
 44. Oviparous: Egg laying animals, the young hatch from eggs laid outside the mother's body. Eg: reptiles and birds
 45. Viviparous: The eggs are covered by membrane. The young ones are born alive after being nourished in the uterus through the placenta. Eg: Human
 46. Ovoviviparous: The embryo develops inside the egg but remain in the mother's body until they are ready to hatch.
 47. Abraham Trembley – Regeneration was first studied by thin scientist in Hydra.
- Unit-1 Chapter-II Human Reproduction
48. Fertilization: Fusion of male and female gametes to form Zygote
 49. Gametogenesis: Formation of gametes by spermatogenesis and oogenesis.
 50. Cleavage: Rapid mitotic divisions of zygote converting single celled zygote into a multicellular structure blastocyst.
 51. Insemination: Transfer of sperms by the male into the female genital tract.
 52. Implantation: Attachment of blastocyst to the uterine wall.
 53. Placentation: Formation of placenta which is the intimate connection between foetus and uterine wall of the mother for exchange of nutrients.
 54. Gastrulation: Process by which blastocyst is changed into a gastrula with three primary germ layers.
 55. Organogenesis: Formation of specific tissues, organs and organ systems from three germ layers.
 56. Parturition: Expulsion of the foetus from the mother's womb.
 57. Tunica albuginea: The fibrous membrane which forms outermost covering of the testis.
 58. Interstitial cells or Leydig cells: These cells are embedded in the soft connective tissue surrounding the seminiferous tubules. These cells are endocrine in nature and secretes androgens namely Testosterone.
 59. Sertoli cells: These are elongated pyramidal cells which provide nourishment to the sperms till maturation and are called as nurse cells also.
 60. Inhibin: A hormone which is involved in negative feedback in the production of sperms and it is secreted by sertolicells.

Botany

- Who was an eminent Botanist in plant embryology, morphology and anatomy?
a) S.Guha b) E.S.Coen c) P.Maheswari d) K.V.Krishnamurthy
- _____ is the scientist who reported polyembryony.
a) E.Strasburger b) E.Hanning c) Hanstein d) G.B.Amici
- Nehemiah Grew mentioned stamens as _____ of a flower.
a) Anther b) Pollen c) Male organ d) Pollen tetrad
- G.B.Amici discovered the pollen tube in the year _____.
a) 1682 b) 1824 c) 1848 d) 1761
- Production of Gamma is found in _____.
a) Spirogyra b) Marchantia c) Hydra d) Planaria
- Aspergillus and Penicillium undergoes _____ type of asexual reproduction.
a) Budding b) Fragmentation c) Conidia d) Regeneration
- In _____ the roots possess buds become detached from the parent plant and grow into independent plant.
a) Ipomoea batatas and Dahlia b) Murraya and Zingiber
c) Pistia and Eichhornia d) Allium and liliun
- A scion and stock having the same thickness is cut obliquely and the scion is fit into the stock and bound with a tape.
a) Bud grafting b) Tongue grafting c) Crown grafting
d) Wedge grafting
- When the root develops, the rooted part is cut and planted to grow as a new plant. This method is called _____.
a) Budding b) Grafting c) Layering d) Cutting
- In _____ the leaf is succulent and notched on its margin which is an epiphyllous bud.
a) Bryophyllum b) Begonia c) Scilla d) Agave
- _____ is a bulbous plant and grow in sandy soils.
a) Pistia b) Eichhornia c) Scilla d) Centella
- Give the examples of stolon _____.
a) Mentha and Fragaria b) Allium cepa and liliun
c) Pistia and Eichhornia d) Dioscorea and Agave
- The last generation of sporogenous tissue functions as _____ cells.
a) Microspore mother cells b) Epidermal cell
c) Endothelial cell d) Primary parietal cells
- The innermost layer of anther wall is _____.
a) Middle layer b) Tapetum c) Connective d) Endothecium
- Third type of tapetum called _____, where the cell wall is not lost protrude into the anther cavity through an amoeboid movement.
a) Secretory tapetum b) Invasive tapetum
c) Ubisch bodies d) Amoeboid
- Palynology is the study of _____.
a) Evolution b) Fossil c) Pollen grains d) Ovary
- _____ is the first cell of the male gametophyte and is haploid.
a) Microspore b) Anther c) Generative nucleus
d) Tube nucleus
- The seed of paddy is one seeded and is called _____.
a) Scutellum b) Caryopsis c) tegmen d) testa
- When the pollen deposits on another flower of the same individual plant it is said to be _____.
a) Dichogamy b) Xenogamy c) Geitonogamy d) Homogamy
- The stigmas mature earlier than the stamens of the flower is called as _____.
a) Dichogamy b) Protogyny c) Protandry d) Herkogamy
- Anemophily is pollination by _____.
a) wind b) water c) animal d) bird
- Pollination by slugs and snails is called _____.
a) Hypohydrophily b) Malacophily c) Entomophily
d) Anemophily
- Double fertilization is commonly found in _____.
a) Angiosperm b) Gymnosperm c) Pteridophytes
d) Bryophytes
- The endosperm with irregularity and unevenness in its surface forms _____ endosperm.
a) Nuclear endosperm b) Cellular endosperm
c) Ruminant endosperm d) Helobial endosperm
- Find out the correct statement:
a) Primary endosperm nucleus (PEN)
b) Post endosperm nucleus (PEN)
c) Pre endosperm nucleus (PEN)
d) Polar endosperm nucleus (PEN)